

### **REMARKS**

This responds to the Final Office Action dated October 5, 2009.

Claim 1 is amended. Claims 1-18, 25-27, and 58-61 remain pending in this application.

#### **§ 112 Rejection of the Claims**

Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite.

Claim 1 has been amended to more clearly describe the recited subject matter. Support for the amendment is found, for example, at page 7, lines 7-18 and page 32, lines 11-12 of the present application. It is believed that the amendment has addressed the issue raised in the Office Action.

Applicant respectfully requests reconsideration and allowance of claims 1-5.

#### **§ 103 Rejection of the Claims**

Claims 1-3, 6, 9, 13, 14, 17, 18, 25, 58, 59, and 60 rejected under 35 U.S.C. 103(a) as being unpatentable over Sweeney (U.S. Patent No. 4,996,984, hereinafter "Sweeney") in view of Leon et al. (U.S. Patent No. 5,365,934, hereinafter "Leon").

#### ***Claim 1***

Claim 1 has been amended to more clearly describe the recited subject matter.

Applicant respectfully traverses the rejection and submits that Sweeney and Leon, individually or in combination with each other and reasoning given in the Office Action, do not provide the claimed subject matter. For example, Applicant is unable to find in Sweeney and Leon, individually or in combination, among other things, a controller adapted to compute a curvature series using sample data points and identify lobes each being an excursion of more than a curvature threshold value from a baseline in the computed curvature series, wherein the curvature series includes curvatures each computed as a non-linear function of first and second derivatives of a sampled signal at one of the sample data points, as recited in claim 1. Applicant is also unable to find a reason in the Office Action that addresses these deficiencies of the cited references.

The claimed subject matter relates to, among other things, computation of a curvature series and identification of lobes in the computed curvature series. As recited in claim 1, the curvature series includes curvatures each computed as a non-linear function of first and second derivatives of a sampled signal at one of sample data points, and the lobes are each an excursion of more than a curvature threshold value from a baseline in the computed curvature series. Applicant is unable to find such computation of curvature series and identification of lobes in Sweeney and Leon. Applicant is also unable to find an assertion in the Office Action that the cited references provide such computation of curvature series and identification of lobes.

Additionally, the controller as recited in claim 1 is adapted to generate a series of characteristic points each associated with a time of a lobe of the identified lobes in the curvature series, and determine a fundamental frequency of the sampled signal by autocorrelating a function of the series of characteristic points, rather than merely “using the first and second derivative of the signal for autocorrelation” as asserted in paragraph 7 of the Office Action. It is respectfully noted that because the characteristic points as recited in claim 1 are not the sample data points, autocorrelation of a function of the series of characteristic points differs from autocorrelation of the sampled signal.

For at least these reasons, Applicant respectfully submits that the Office Action does not set forth a *prima facie* case of obviousness.

Applicant respectfully requests reconsideration and allowance of claim 1.

#### *Claims 2-3*

Applicant respectfully traverses the rejection. Claims 2-3 are dependent on claim 1, which is believed to be patentable as discussed above. Therefore, the discussion above for claim 1 is incorporated herein to support the patentability of claims 2-3.

Applicant respectfully requests reconsideration and allowance of claims 2-3.

#### *Claim 6*

Applicant respectfully traverses the rejection and submits that Sweeney and Leon, individually or in combination with each other and reasoning given in the Office Action, do not provide the claimed subject matter. For example, Applicant is unable to find in Sweeney and

Leon, individually or in combination, among other things, calculating a series of curvatures each as a non-linear function of first and second derivatives of a cardiac signal at one of a sample data points, and identifying lobes each being an excursion of more than a curvature threshold value from a baseline in the calculated series of curvatures, as recited in claim 6. Applicant is also unable to find a reason in the Office Action that addresses these deficiencies of the cited references.

Because claims 1 and 6 are rejected on the same ground (paragraphs 6-7 of the Office Action), the discussion for claim 1 above is incorporated herein to further support the patentability of claim 6.

Applicant respectfully requests reconsideration and allowance of claim 6.

#### *Claim 9*

Applicant respectfully traverses the rejection. Claim 9 is dependent on claim 6, which is believed to be patentable as discussed above. Therefore, the discussion above for claim 6 is incorporated herein to support the patentability of claim 9.

Applicant respectfully requests reconsideration and allowance of claim 9.

#### *Claim 13*

Applicant respectfully traverses the rejection and submits that Sweeney and Leon, individually or in combination with each other and reasoning given in the Office Action, do not provide the claimed subject matter. For example, Applicant is unable to find in Sweeney and Leon, individually or in combination, among other things, using a processor to generate a curvature series by computing curvatures each as a non-linear function of first and second derivatives at a sample point of a sampled input signal, and identifying lobes each being an excursion from a baseline in the curvatures series using a curvature threshold value, as recited in claim 13. Applicant is also unable to find a reason in the Office Action that addresses these deficiencies of the cited references.

Because claims 1 and 6 are rejected on the same ground (paragraphs 6-7 of the Office Action), the discussion for claim 1 above is incorporated herein to further support the patentability of claim 13.

Applicant respectfully requests reconsideration and allowance of claim 13.

*Claims 14 and 17-18*

Applicant respectfully traverses the rejection. Claims 14 and 17-18 are dependent on claim 13, which is believed to be patentable as discussed above. Therefore, the discussion above for claim 13 is incorporated herein to support the patentability of claims 14 and 17-18.

Applicant respectfully requests reconsideration and allowance of claims 14 and 17-18.

*Claim 25*

Applicant respectfully traverses the rejection and submits that Sweeney and Leon, individually or in combination with each other and reasoning given in the Office Action, do not provide the claimed subject matter. For example, Applicant is unable to find in Sweeney and Leon, individually or in combination, among other things, generating a curvature series using sampled data points by computing curvatures each as a non-linear function of first and second derivatives of a sampled cardiac signal at one of the sampled data points, and identifying lobes each being an excursion of more than a curvature threshold value from a baseline in the curvature series, as recited in claim 25. Applicant is also unable to find a reason in the Office Action that addresses these deficiencies of the cited references.

Because the reasoning given in paragraphs 6-7 of the Office Action applies to both claims 1 and 25, and the additional reasoning with regard to claim 25 given in paragraph 11 of the Office Action does not appear to remedy the deficiency of the rejection of claim 1 using Sweeney and Leon, the discussion for claim 1 above is incorporated herein to further support the patentability of claim 25.

Applicant respectfully requests reconsideration and allowance of claim 25.

*Claim 58*

Applicant respectfully traverses the rejection and submits that Sweeney and Leon, individually or in combination with each other and reasoning given in the Office Action, do not provide the claimed subject matter. For example, Applicant is unable to find in Sweeney and Leon, individually or in combination, among other things, generating a first curvature series

using first sampled data points by calculating curvatures each as a non-linear function of first and second derivatives of a first sampled signal at one of the first sampled data points, generating a second curvature series using second sampled data points by calculating curvatures each being a non-linear function of first and second derivatives of a second sampled signal at one of the second sampled data points, identifying first lobes each being an excursion from a baseline in the first curvature series using a first curvature threshold value, and identifying second lobes each being an excursion from a baseline in the second curvature series using a second curvature threshold value, as recited in claim 58. Applicant is also unable to find a reason in the Office Action that addresses these deficiencies of the cited references.

Because the reasoning given in paragraphs 6-7 of the Office Action applies to both claims 1 and 25, and the additional reasoning with regard to claim 58 given in paragraph 11 of the Office Action does not appear to remedy the deficiency of the rejection of claim 1 using Sweeney and Leon, the discussion for claim 1 above is incorporated herein to further support the patentability of claim 58.

Applicant respectfully requests reconsideration and allowance of claim 58.

#### *Claims 59-60*

Applicant respectfully traverses the rejection. Claims 59-60 are dependent on claim 58, which is believed to be patentable as discussed above. Therefore, the discussion above for claim 58 is incorporated herein to support the patentability of claims 59-60.

Applicant respectfully requests reconsideration and allowance of claims 59-60.

Claims 4-5, 11-12, 15, 16, and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sweeney in view of Leon as applied above.

Applicant respectfully traverses the rejection. Claims 4-5 are dependent on claim 1. Claims 11-12 are dependent on claim 6. Claims 15-16 are dependent on claim 13. Claim 61 is dependent on claim 58. Claims 1, 6, 13, and 58 are believed to be patentable as discussed above. Applicant is unable to find additional reasoning in the Office Action that remedies the deficiency of the rejection of claims 1, 6, 13, and 58 using Sweeney and Leon as discussed above.

Therefore, the discussions above for claims 1, 6, 13, and 58 are incorporated herein to support the patentability of claims 4-5, 11-12, 15-16, and 61.

Applicant respectfully requests reconsideration and allowance of claims 4-5, 11-12, 15-16, and 61.

Claims 7-8, 10, and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sweeney in view of Leon as applied above in view of Marcus (U.S. Patent No. 4,637,400, hereinafter "Marcus").

Applicant respectfully traverses the rejection. Claims 7-8 and 10 are dependent on claim 6. Claims 26-27 are dependent on claim 25. Claims 6 and 25 are believed to be patentable as discussed above. Marcus does not appear to remedy the deficiency of the rejection of claims 6 and 25 using Sweeney and Leon as discussed above. Therefore, the discussions above for claims 6 and 25 are incorporated herein to support the patentability of claims 7-8, 10, and 26-27.

Applicant respectfully requests reconsideration and allowance of claims 7-8, 10, and 26-27.

**CONCLUSION**

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's representative at (612) 373-6965 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.  
P.O. Box 2938  
Minneapolis, MN 55402--0938  
(612) 373-6965

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By /Zhengnian Tang/

Zhengnian Tang  
Reg. No. 55,666

**CERTIFICATE UNDER 37 CFR 1.8:** The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 18th day of December, 2009.

Kate Gannon

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